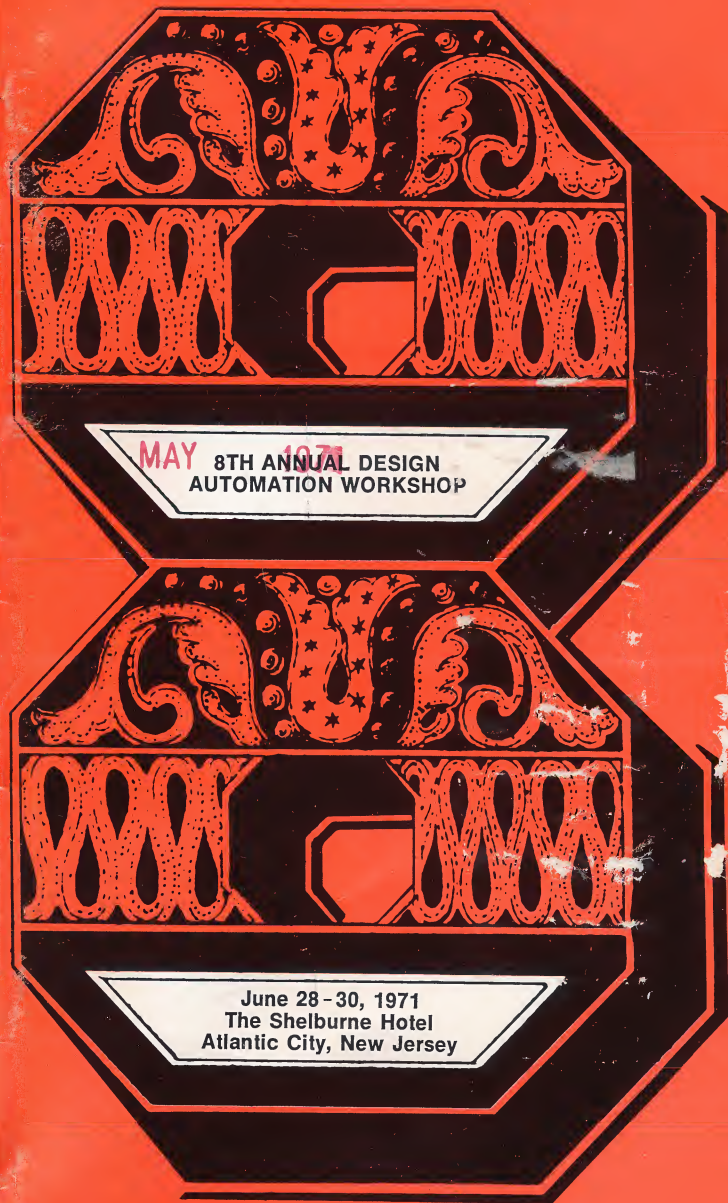


IEEE COMPUTER SOCIETY
 8949 Reseda Blvd.
 Suite 202
 Northridge, Ca. 91324

03107870NELSON-THEOD
 MR. THEODOR H. NELSON
 BOX 3
 SCHDOLEYS MT N J 07870



EIGHTH ANNUAL DESIGN AUTOMATION WORKSHOP

June 28-30, 1971
The Shelburne Hotel
Atlantic City, New Jersey

Sponsored by

SHARE

(An IBM User Group, Design Automation Project)

ACM

(Special Interest Group on Design Automation)

IEEE Computer Society

MAY

1971

General Information

The 8th Annual Design Automation Workshop is sponsored by the ACM (Association for Computing Machinery, Special Interest Group on Design Automation), IEEE Computer Society (Institute of Electrical and Electronics Engineers), and SHARE (an IBM User Group, Design Automation Project).

Headquarters Hotel

The Shelburne Hotel, Boardwalk at Michigan Avenue, Atlantic City, New Jersey 08404.

Telephone (609) 344-8131

The opening and joint sessions, and all "A" sessions will be held in the West Ballroom, all "B" sessions in Shannon Hall.

Housing

A block of rooms has been reserved at the Shelburne Hotel. Kindly communicate directly with the hotel. A hotel reservation form is provided in the back of the program for your convenience. When using company or personal stationery, please be sure to specify that you will attend the Eighth Annual Design Automation Workshop.

Registration Fee

\$45.00 Advance Registration

\$55.00 Registration at the Workshop

The fee includes two luncheons, coffee service, and one copy of the Workshop Proceedings. Early enrollment is recommended. All advance registration forms must be received no later than May 31, 1971. After that date attendees are requested to register at the Workshop. Refunds will be made upon request until May 31, 1971.

Workshop Proceedings

The Proceedings will contain all papers, including significant visual material for each paper. Each registrant will receive one copy of the Proceedings at the Workshop prior to the start of sessions. Additional copies may be purchased at the Workshop for \$8.00. After the Workshop, additional copies may be ordered from the Association for Computing Machinery, Order Department, 1133 Avenue of the Americas, New York, New York 10019.

Registration Hours

All persons attending the Workshop will be required to register. The registration desk will be located in the Georgian Lounge of the Shelburne Hotel and will be open during the following hours:

Sunday, June 27 — 3:00 PM - 7:00 PM

Monday, June 28 — 8:00 AM - 5:00 PM

Tuesday, June 29 — 8:00 AM - 3:00 PM

Transportation

Excellent air, rail, bus, limousine, and auto transportation exists to Atlantic City.

The best air service from most points is via the International Airport at Philadelphia. Limousine service from the airport is frequent and direct to the Shelburne Hotel in 75 minutes. Atlantic City also has direct air service from Washington and New York via Allegheny Airlines.

Atlantic City is served by the Pennsylvania-Reading Seashore Rail Line, and several non-stop express buses from New York and Philadelphia. Check with your travel agent. Atlantic City is also easily reached by auto (2 hours from New York City).

Chairman's Message

The Design Automation Workshop has for the past seven years provided a forum for the interchange of ideas among those involved with or interested in the automation of various portions of the design process. Design automation began in the design of digital computers, spread to other kinds of electronic design, and is now involved with virtually every kind of design activity. Those of us responsible for the organization and planning of these Workshops strive constantly to keep up with the changing interests of the attendees and the expanding scope of the subject area. As a result, there is always something "old" and something "new" about each Workshop. This year is no exception: we have listened to the criticisms of previous Workshops and have made what we believe are substantial improvements.

First, the matter of format. As of old, there are "A" and "B" sessions, a total of forty high-quality papers. The new idea is the inclusion of tutorial sessions, one primarily for the novice on solutions to the placement problem, the other primarily for the more experienced person on management of design automation. But whether you are new or old in the business, both these presentations should prove interesting and educational.

Secondly, the content. The "A" sessions are devoted to the old original subject matter of these Workshops, namely electronic design automation with emphasis on digital design. The "B" sessions, on the other hand, represent a new departure into the emerging field of architectural design automation. Thanks to the energetic efforts of Bill Miller, we have put together five sessions containing fifteen excellent papers in this field.

Third, the local arrangements. The Workshop is returning to its old home town, Atlantic City, but at a newly-remodeled hotel which offers every convenience and comfort. We have retained the old Birds-of-a-Feather sessions for informal getting together with persons of like interests; we have also reserved space for the new idea of chatting with authors immediately following their sessions. And there are plenty of opportunities for recreation, both old and new, in this world-famous resort city.

Finally, I wish to take this opportunity to thank Harry Taxin for putting together this program booklet and to John Kirkley of the IEEE Computer Society for getting it published in timely fashion. Thanks are due also to all the Committee members and to everyone else who has contributed to the preparation of this "old/new" Eighth Annual Design Automation Workshop.

See you in Atlantic City!

— Alan H. Halpin, Chairman

Workshop Committee

WORKSHOP CHAIRMAN

A. H. HALPIN
California Software Associates
2100 Sepulveda Blvd., Suite 42
Manhattan Beach, California. 90266
213 376-4718

WORKSHOP VICE CHAIRMAN

H. FREITAG
IBM Watson Research Center
P.O. Box 218
Yorktown Heights, N.Y. 10598
914 945-1946

SECRETARY

H. WALL
Raytheon
40 Second Avenue
Waltham, Massachusetts 02154
617 899-9400 X369

PROGRAM CHAIRMAN

R. B. HITCHCOCK
IBM Watson Research Center
P.O. Box 218
Yorktown Heights, New York 10598
914 945-1698

TREASURER/REGISTRATION

J. M. GALEY
IBM Corp. Dept G90, Bldg. 14
Monterey & Cottle Roads
San Jose, California 95114
408 227-7100 X3626

ARRANGEMENTS CHAIRMAN

P. O. PISTILLI
Bell Telephone Laboratories
7350 North Broadway
Denver, Colorado 80221
303 427-4326

PUBLICATIONS CHAIRMAN

G. J. HERSKOWITZ
Stevens Institute of Tech.
Castle Point Station
Hoboken, New Jersey 07030
201 792-2700

PUBLICITY CHAIRMAN

N. GARAFFA, JR.
RCA - A301
200 Forest Street
Marlboro, Massachusetts 01752
617 485-6000 X2277

MONDAY, JUNE 28, 1971

Opening Session

West Ballroom

9:00 AM

INTRODUCTION, WELCOME, and
OPENING REMARKS
Chairman: Alan H. Halpin

9:15 AM

KEYNOTE ADDRESS

"COST REDUCTION: THE CHALLENGE TO
DESIGN AUTOMATION," CHARLES A.
FOWLER, VICE PRESIDENT, RAYTHEON
COMPANY.

C. A. Fowler is a vice president of the Raytheon Company and Manager of its Equipment Division Equipment Development Laboratory. He was formerly Deputy Director of Defense Research and Engineering, U.S. Department of Defense.

10:15 AM

COFFEE BREAK

10:30 AM

"THE PLACEMENT PROBLEM — A TUTORIAL,"
MAURICE HANAN, IBM RESEARCH, YORKTOWN
HEIGHTS, NEW YORK.

The placement problem and its relation to the computer packaging problem (which includes partitioning and wire routing) will be discussed. A survey of placement algorithms and the associated quadratic assignment problem will be presented.

12:00 NOON

LUNCH BREAK

1A

MONDAY, JUNE 28, 1971

Session 1A: A Digital Design Language

Chairman: Pat O. Pistilli, Bell Telephone Laboratories, Denver, Colorado.

2:15 PM

"A DIGITAL SYSTEM MODELING AND DESIGN LANGUAGE," MEHMET B. BARAY, STEPHEN Y. H. SU, UNIVERSITY OF CALIFORNIA, BERKELEY.

A language is described for general purpose system modeling and design. The language is a very powerful descriptive tool stressing generality and modularity.

2:45 PM

"THE STRUCTURE AND OPERATION OF A SYSTEM MODELING LANGUAGE COMPATIBLE SIMULATOR," MEHMET B. BARAY, STEPHEN Y. H. SU, ROBERT L. CARBERRY, UNIVERSITY OF CALIFORNIA, BERKELEY.

In this paper an application of the system modeling and design language described above is presented to show a typical use. Examples of simulator operation will be presented including table building from the model specification and the various list manipulating operations.

3:15 PM

"SYSTEM MODELING LANGUAGE TRANSLATOR," MEHMET B. BARAY, STEPHEN Y. H. SU, UNIVERSITY OF CALIFORNIA, BERKELEY.

This paper describes the language translator for the system modeling approach described above. Three main areas will be considered: (1) identification of sections of the system which can be translated independently, (2) definition and generation of the tables required by the table driven translator, and (3) processing of the table information in order to generate logic diagrams of this system.

3:45 PM

BREAK

1B

MONDAY, JUNE 28, 1971

Session 1B: Introduction to Architectural Design Automation

Chairman: William R. Miller, Albert C. Martin and Associates, Los Angeles

2:15 PM

"A SUMMARY OF ARCHITECTURAL INVOLVEMENT WITH COMPUTERS," C. JONES OLSTEN, CALIFORNIA STATE POLYTECHNIC COLLEGE, SAN LUIS OBISPO.

A survey over the last decade of computer applications in architecture. The presentation is supplemented with an intensive bibliography on the subject.

2:45 PM

"THE FUTURE OF COMPUTER APPLICATIONS IN THE ARCHITECTURAL PROFESSION," GIFFORD H. ALBRIGHT, THE PENNSYLVANIA STATE UNIVERSITY.

A commentary on the future of computer application in architecture.

3:15 PM

"A SYSTEMS APPROACH TO HOUSING," ANTHONY J. SCHNARSKY, UNIVERSITY OF WISCONSIN, MILWAUKEE, WISCONSIN.

A suggested interface between automated design techniques and automated industrialized processes as related to the housing problem.

3:45 PM

BREAK

2A

MONDAY, JUNE 28, 1971

Session 2A: Simulation

Chairman: Soon Oh Hong, RCA, Marlboro, Massachusetts

4:00 PM

"A MICROPROGRAM SIMULATOR," STEVE YOUNG, RCA, MARLBORO, MASSACHUSETTS.

A simulation system for the development of computers incorporating microcode control is described. The system has simulated control logic and diagnostics on real machines with widely differing organization. The machines include direct and indirect control, as well as read only and user writable control memories.

4:30 PM

"RACE ANALYSIS OF DIGITAL SYSTEMS WITHOUT LOGIC SIMULATION," R. A. HARRISON, D. J. OLSEN, DELCO ELECTRONICS, MILWAUKEE, WISCONSIN.

A race analysis system that does not require time sequence logic simulation is described. The system does not require network input stimuli and uses only a minimal amount of host computer operating time. Accurate critical timing race analysis of digital systems of significant complexity using worst case and/or pseudo statistical analysis techniques are achievable.



7:00 PM

"BIRDS OF A FEATHER" SESSIONS

2B

MONDAY, JUNE 28, 1971

Session 2B: Interactive Design Systems

Chairman: Alyce Branum, Information Displays, Inc., Encino, California

4:00 PM

"ARCHITECTURAL INTERACTIVE DESIGN SYSTEM (AIDS)," ERIC TEICHOLZ, DESIGN SYSTEMS, INC., BOSTON, MASSACHUSETTS.

A presentation of the AIDS system, a computer based interactive design configuration developed for architectural designers.

4:30 PM

"IMAGE: AN INTERACTIVE GRAPHICS-BASED COMPUTER SYSTEM FOR MULTI-CONSTRAINED SPATIAL SYNTHESIS," GUY WEINZAPFEL, MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

The presentation describes the operation and application of IMAGE, an interactive computer system to aid designers solving architectural space arrangement problems.



7:00 PM

"BIRDS OF A FEATHER" SESSIONS

3A

TUESDAY, JUNE 29, 1971

Session 3A: Packaging

Chairman: Ben Britt, IBM, San Jose, California

9:00 AM

"REVISITING AN OPERATIONAL GRAPHIC DESIGN SYSTEM," STEVEN P. KROSNER, WILLIAM H. SASS, IBM, KINGSTON, NEW YORK.

A description of actual experience in installing an experimental graphic system for printed circuit card designing is presented. A new technique for planning, structuring, coding and implementing highly efficient graphic design systems will be given.

9:30 AM

"ALMS: AUTOMATED LOGIC MAPPING SYSTEM," ROY L. RUSSO, PETER K. WOLFF, SR., IBM RESEARCH, YORKTOWN HEIGHTS, NEW YORK.

ALMS is a set of computer programs which uses a two step heuristic technique to solve the mapping (partitioning) problem for logical structures.

10:00 AM

"PARTITIONING AND ORDERING OF LOGIC EQUATIONS FOR OPTIMUM MOS LSI DEVICE LAYOUT," L. MARGOL, MICROELECTRONICS COMPANY, ANAHEIM, CALIFORNIA.

Three digital computer programs will be described which are currently used as a design aid to custom layouts for integrated circuit chips.

10:30 AM

COFFEE BREAK

10:45 AM

"A COMPUTER ALGORITHM FOR PLACING ELECTRONIC COMPONENTS WITH THE OBJECTIVE OF MINIMIZING TOTAL INTERCONNECTING WIRE LENGTH," F. TAYLOR SCANLON, HONEYWELL INFORMATION SYSTEMS, PHOENIX, ARIZONA.

A placement algorithm effective in the design of circuit boards that have many integrated circuits attached is presented.

11:15 AM

"WIRING ROUTING BY OPTIMIZING CHANNEL ASSIGNMENT WITHIN LARGE APERTURES," AKIHIRO HASHIMOTO, JAMES STEVENS, UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS.

A new wire routing method for two layer printed circuit boards is presented. The primary goals of the method are speed of execution and flexibility in assigning wire positions.

3B

TUESDAY, JUNE 29, 1971

Session 3B: Computer-Aided Space Planning

Chairman: Vahe Khachooni, Daniel, Mann, Johnson, and Mendenhall, Los Angeles

9:00 AM

"AN APPROACH TO COMPUTERIZED SPACE PLANNING USING GRAPH THEORY," JOHN GRASON, CARNEGIE-MELLON UNIVERSITY

This paper treats computerized space planning by discussing methods for the solution of floor plan design problems using linear graph theory.

9:30 AM

"ACD: COMPUTER AIDED DESIGN," FRANZ S. VEIT, ARCHITECT, GRAND ISLAND, NEW YORK.

A description of ANALYZE-COMPOSE-DISPLAY, a set of computer programs developed as an aid for the design of complex buildings.

10:00 AM

"THE AUTOMATED GENERATION OF ARCHITECTURAL FORM," WILLIAM MITCHELL, UNIVERSITY OF CALIFORNIA, LOS ANGELES.

This paper describes research regarding the properties of certain form-generating systems which are used to illustrate some of the potentials and limitations of combinatorial approaches to the automated generation of architectural form.

10:30 AM

COFFEE BREAK

10:45 AM

"HEURISTIC ALGORITHMS FOR AUTOMATED SPACE PLANNING," CHARLES M. EASTMAN, CARNEGIE-MELLON UNIVERSITY.

This paper describes the search algorithms used in GSP, a program allowing formulation and automatic resolution of a wide variety of spatially oriented two-dimensional design tasks.

11:15 AM

"RELATE: RELATIONSHIP LAYOUT TECHNIQUE," RICHARD N. WHITE, LESTER GORSLINE AND ASSOCIATES, TIBURON, CALIFORNIA.

This paper describes RELATE, a computer program designed to assist the facilities design process. It is used to develop three-dimensional block plan layouts (form diagrams) economically and to help solve the "combinatorial" aspects of plan layouts.

TUESDAY, JUNE 29, 1971**12:00 NOON****CONFERENCE LUNCHEON**

Speaker: James Lord, Principal Systems Engineer,
Albert C. Martin & Associates, Los Angeles, California
"EARTHQUAKE SIMULATION"

Mr. Lord will present a brief discussion of what is an earthquake and how earthquakes are measured. A review of the procedures used to combat the destructive forces of earthquakes will follow. Finally, an evaluation of the February 9th, 1971 California earthquake will be presented.

MONDAY, JUNE 28, 1971

Opening Session
Keynote Address
Tutorial

Lunch Break

1A
A Digital
Design
Language

1B
Introduc-
tion to Ar-
chitectural
Design
Automation

2A
Simulation

2B
Interactive
Design
Systems

Birds of a Feather
Sessions

TUESDAY, JUNE 29, 1971

3A
Packaging

3B
Computer-
Aided
Space
Planning

Luncheon

Tutorial

Common Interest
Group Meetings

Birds of a Feather
Sessions

TUESDAY, JUNE 29, 1971**2:15 PM****JOINT SESSION**

"THE MANAGEMENT OF DESIGN AUTOMATION
— A TUTORIAL," JOHN R. HANNE, TEXAS
INSTRUMENTS.

The session on management of Design Automation Systems will address itself to the criteria used to evaluate Design Automation Systems as well as techniques for the implementation of systems with these measures.

3:45 PM

BREAK

4:00 PM

COMMON INTEREST GROUP MEETINGS

WEDNESDAY, JUNE 30, 1971

4A
Testing — I

4B
Design
Models

5A
Testing — II

5B
Architec-
tural Man-
agement
Systems

Luncheon

6A
Design
Automation
Systems

6B
General
Topics

THURSDAY, JULY 1, 1971**Special Interest Sessions**

Workshop Planning
Committees

4A

WEDNESDAY, JUNE 29, 1971

Session 4A: Testing and Test Generation — I

Chairman: J. Paul Roth, IBM Research, Yorktown Heights, New York.

9:00 AM

"A PATH ANALYSIS APPROACH TO THE DIAGNOSIS OF COMBINATIONAL CIRCUITS," SARMA R. VISHNUBHOTLA, YING H. CHUANG, WASHINGTON UNIVERSITY, ST. LOUIS, MISSOURI.

This paper gives an approach to the construction of a minimal set of tests that detect all single faults of the stuck at 1 and stuck at 0 types in a combinational circuit. This approach is also used to construct a set of tests which gives complete location information; all faults locatable by external observations can be located by this set of tests.

9:30 AM

"APPLICATION OF A LOGIC FAULT ANALYZER TO THE MANUFACTURE AND MAINTENANCE OF THE CONTROL DATA 7600 COMPUTER," LIONEL C. BENING, JR., CDC, SAINT PAUL, MINNESOTA.

This paper describes the application of a sequential logic fault analyzer to the problem of modular tests for the Control Data 7600 computer. A description of the sequential analyzer is provided first. Next the development of test sequences for the 231 logic modular types that comprise the 7600 is considered.

10:00 AM

"AN AUTOMATED METHOD FOR DESIGNING LOGIC CIRCUIT DIAGNOSTIC PROGRAMS," MASA AKI NAGAMINE, FUJITSU LIMITED, KAWASAKI, JAPAN.

An automatic test pattern generation method for detecting faults and logic circuits is described.

10:30 AM

COFFEE BREAK

4B

WEDNESDAY, JUNE 29, 1971

Session 4B: Design Models

Chairman: Anthony J. Schnarsky, University of Wisconsin.

9:00 AM

"CLUSTER: A PROGRAM FOR STRUCTURING DESIGN PROBLEMS," MURRY MILNE, UNIVERSITY OF CALIFORNIA, LOS ANGELES.

This paper describes CLUSTER, a computer program for articulating the informational structure of the architectural design process. It displays a diagram of the problem structure to the designer and reveals the consequences of his design decisions.

9:30 AM

"THE THREE DIMENSIONS OF ARCHITECTURAL DESIGN AUTOMATION," HARVEY N. LERMAN, MARTIN MARIETTA CORPORATION, ORLANDO, FLORIDA.

A computer program for generating perspective drawings is described. The program solves the hidden line problem and provides numerous benefits to the user.

10:00 AM

"COMPUTER SIMULATION OF ELEVATOR SYSTEMS," ALTON J. PENZ, CARNEGIE-MELLON UNIVERSITY

This paper describes a simulation program developed by the author for modeling elevator systems. The program permits modeling a variety of systems without sacrificing the sophistication necessary to perform detailed analyses.

10:30 AM

COFFEE BREAK

5A

WEDNESDAY, JUNE 29, 1971

Session 5A: Testing and Test Generation — II

Chairman: J. Paul Roth, IBM Research, Yorktown Heights, New York.

10:45 AM

THE DETECTION AND DIAGNOSIS OF MEMORY SYSTEM FAULTS," ALAN R. KLAYTON, LEHIGH UNIVERSITY, BETHLEHEM, PENNSYLVANIA.

Algorithms for the detection and diagnosis of faults in a generalized random access, word organized memory system are presented, discussed and proven. The problem of fault masking and interaction between major elements of the system is investigated and considered in the development of the algorithms.

11:15 AM

"MINIMUM TEST PATTERNS FOR RESIDUE NETWORKS," DOUGLAS C. BOSSEN, DANIEL L. OSTAPKO, ARVIND M. PATEL, MARTIN S. SCHMOOKLER, IBM-SDD, POUGHKEEPSIE, NEW YORK.

This paper deals with minimizing the test patterns used for detecting failures in networks used for calculating residues. Such logic structures are often needed in computer applications for checking arithmetic operations for residue number systems or with modulo-2 residues as parity checks.

11:45 AM

LUNCHEON

5B

WEDNESDAY, JUNE 29, 1971

Session 5B: Architectural Management Systems

Chairman: Ted Harsham, Hertz & Knowles, San Francisco

10:45 AM

"AN INFORMATION SYSTEM IN ARCHITECTURAL PRACTICE," C. DAVID SIDES, JR., SKIDMORE, OWENS AND MERRILL, ARCHITECTS, SAN FRANCISCO, CALIFORNIA. The described computer-based information system provides a minimum of restrictions for future development, and can meet the immediate demands of the architectural profession within the limits of economic feasibility.

11:15 AM

"PROJECT MANAGEMENT SYSTEMS FOR ARCHITECTURE," JAMES F. WEAVER, LOUIS C. KINGSCOTT AND ASSOCIATES, INC., KALAMAZOO, MICHIGAN.

This paper is a detailed explanation of the purpose and operation of certain management tools, their relationship to the accounting and payroll systems, and an evaluation of their effectiveness.

11:45 AM

LUNCHEON

6A

WEDNESDAY, JUNE 29, 1971

Session 6A: Design Automation Systems

Chairman: Harry M. Taxin, Hughes Aircraft, Culver City, California.

2:15 PM

"RAINBOW: AN INTEGRATED CAD SYSTEM," HEINZ U. LEMKE, C. J. CHENEY, M. ETHELTON, N. E. WISEMAN, UNIVERSITY OF CAMBRIDGE, CAMBRIDGE, ENGLAND.

This paper discusses an experimental integrated design system being developed at Cambridge University, aimed at exposing some principles of good practice in the construction of large ensembles of CAD programs.

2:45 PM

"AN INTERACTIVE GRAPHICAL LOGIC DESIGN SIMULATION SYSTEM," W. B. BARKER, HARVARD UNIVERSITY, CAMBRIDGE, MASSACHUSETTS.

An interactive graphical logic design simulation program has been developed on a PDP-1. Using a Graphacon tablet and a DEC Type 340 scope one can define the logical structure and simulate the operation of this structure on the display.

3:15 PM

"CIBOL — AN INTERACTIVE GRAPHICS PROGRAM USED IN THE DESIGN OF PRINTED WIRING BOARDS AND GENERATION OF ASSOCIATED ARTMASTERS," T. J. KRIEWEALL, N. R. MILLER, BELL TELEPHONE LABORATORIES, WHIPPANY, NEW JERSEY.

CIBOL is an application program that uses a computer graphics facility to aid in the design of discrete component printed wiring boards.

4:00 PM

"THE ON-LINE LOGICAL SIMULATION (OLLS) SYSTEM," RICHARD M. TAVAN, H. ROBERT HOWIE, CAMBRIDGE, MASSACHUSETTS.

The OLLS System is a complete software package which permits a logic designer to interactively design, layout and simulate large digital systems using the IBM 2250 CRT.

4:30 PM

"LOGIC DESIGN SYSTEM, A PROBLEM ORIENTED LANGUAGE TO PROGRAM AUTOMATED DIGITAL DESIGN," CARL E. MINICH, FREDERICK G. LINNEMANN, SANDERS ASSOCIATES, INC., NASHUA, NEW HAMPSHIRE.

The LDS System is a set of FORTRAN computer programs to convert Boolean equations and component descriptions into logic diagrams, parts lists, board layouts, wiring lists and diagnostics.

6B

WEDNESDAY, JUNE 29, 1971

Session 6B: General Topics in Design Automation

Chairman: Harlow Freitag, IBM Research, Yorktown Heights, New York.

2:15 PM

"NONLISA: NONLINEAR NETWORK SIMULATION AND ANALYSIS PROGRAM," TORU TSUDA, TAKUHITO KOJIMA, SHINJI GOTO, TOSHIHIKO NAKAMURA, FUJITSU LIMITED, KAWASAKI, JAPAN.

This paper describes a program for analyzing electronic circuits containing non-linear elements.

2:45 PM

"MULTIPLY INDEXED DATA MANAGEMENT," THOMAS BERETVAS, IBM-SDD, POUGHKEEPSIE, NEW YORK.

A data management facility has been designed to satisfy the specific needs of design automation.

3:15 PM

"COMPUTER CONTROLLED HARDWARE TESTING," JEAN SHERMAN, IBM-SDD, SAN JOSE, CALIFORNIA.

This paper reviews comprehensively the use of process control computers for integrated circuit chip testing. Proper procedures, programming languages, diagnostics, safety and communications between the computer and backup large-scale computation are discussed.

3:45 PM

BREAK

4:00 PM

"MASK SHOP INFORMATION SYSTEM," J. G. BRINSFIELD, BELL TELEPHONE LABORATORIES, WHIPPANY, NEW JERSEY.

The mask shop information system is a computer system which provides real time control of a shop where integrated circuit masks are made. This system is now in use at two Bell Laboratory locations.

4:30 PM

"COMPUTER EXPANSION OF BOOLEAN EXPRESSIONS," YING H. CHUANG, WASHINGTON UNIVERSITY, ST. LOUIS, MISSOURI.

A computation for the symbolic expansion of Boolean expressions into the disjunctive normal form (i.e., sum of products form) is discussed.

NOTES

HOTEL RESERVATION FORM

Eighth Annual Design Automation Workshop
June 28-30, 1971

Please mail this form (or facsimile) not later than
June 12, 1971

Reservations Manager
The Shelburne Hotel
2005 Boardwalk
Atlantic City, New Jersey 08404

Name _____

Company _____

Address _____

City _____

State _____

Zip _____

Arrival Date _____

Time _____

Departure Date _____

Time _____

Single Occupancy: \$14 \$16 \$20

Double Occupancy: \$16 \$18 \$20

Circle desired Accommodations and Rate

Cut along dashed line

ADVANCE REGISTRATION FORM

Advance registration closes May 31, 1971. Your
check must accompany this form. Kindly mail form
with check payable to "1971 D/A Workshop" to:

Mr. J. M. Galey
IBM, Dept. G90, Bldg. 14
Monterey & Cottle Roads
San Jose, CA 95114

Name _____

Company _____

City _____

State _____

Zip _____

Enclosed is \$45.00 advance registration fee (in-
cludes two luncheons, coffee service, and one
copy of the Workshop Proceedings).